

May 27, 1969

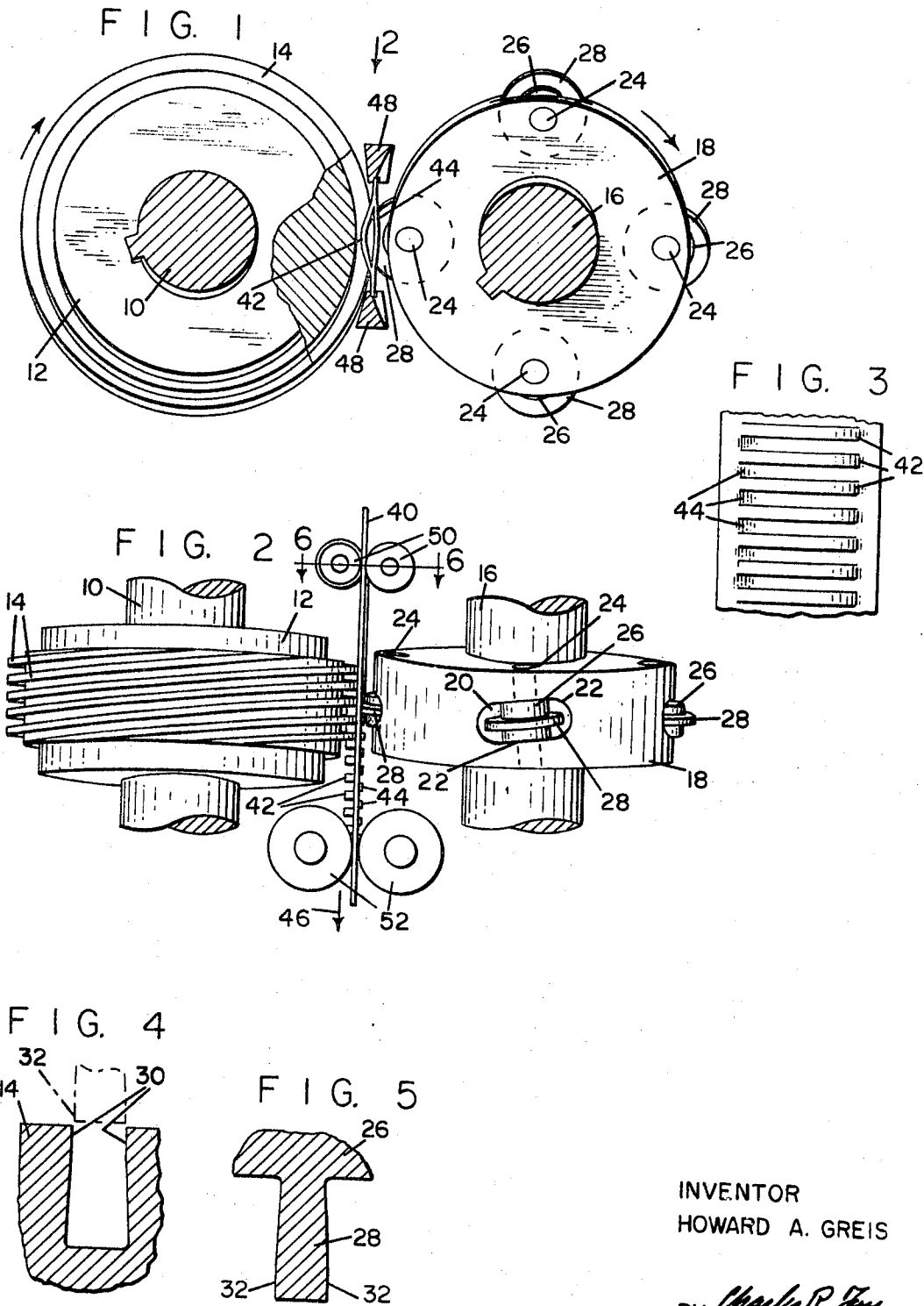
H. A. GREIS

3,446,049

APPARATUS FOR SLITTING AND FORMING STRIP MATERIAL

Filed Sept. 8, 1967

Sheet 1 of 2



INVENTOR  
HOWARD A. GREIS

BY *Charles P. Foy,*  
ATTORNEY

May 27, 1969

H. A. GREIS

3,446,049

APPARATUS FOR SLITTING AND FORMING STRIP MATERIAL

Filed Sept. 8, 1967

Sheet 2 of 2

FIG. 7

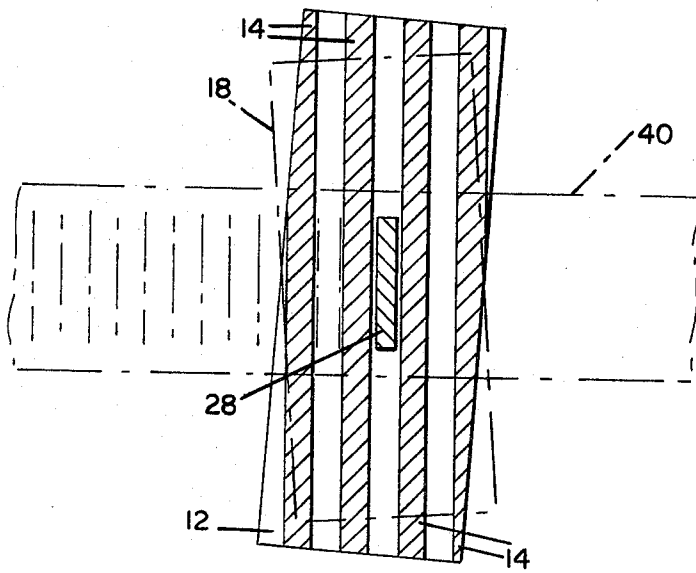


FIG. 8

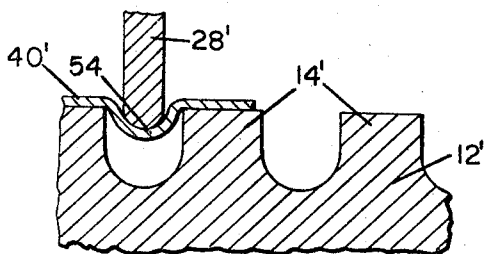
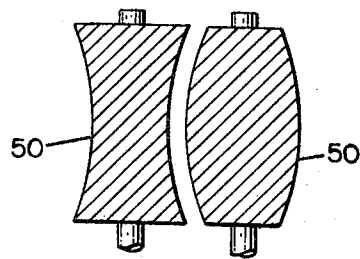


FIG. 6



INVENTOR  
HOWARD A. GREIS

BY  
ATTORNEY

1

2

3,446,049

**APPARATUS FOR SLITTING AND FORMING STRIP MATERIAL**

Howard A. Greis, Holden, Mass., assignor to Kinefac Corporation, Worcester, Mass., a corporation of Massachusetts

Filed Sept. 8, 1967, Ser. No. 666,253

Int. Cl. B21d 28/36, 28/26

U.S. Cl. 72—186

9 Claims

**ABSTRACT OF THE DISCLOSURE**

A slitting and forming apparatus particularly for acting upon sheet metal strip and utilizing a pair of cooperating male and female rotary dies in skewed relationship so that the strip passing between them will be automatically fed and at the same time acted upon by the dies, wherein the female rotary die comprises a generally continuous helical thread-like operative surface and the male rotary die is provided by intermittent mutually circumferentially spaced cutting members or operative surfaces which cooperate with the female die by entering between the starts thereof in order to either form i.e., dimples, or slits in the strip.

This invention relates to apparatus for slitting or forming strip material, e.g. metal strips, providing transverse parallel spaced slits or dimples therein and forming the material by in effect rounding it out between alternate steps of operation so that the strip produced has a series of mutually spaced outwardly curved straps or dimples.

The device of the present invention provides such sheet metal strips at a high rate of speed through the use of a pair of driven rotary dies arranged on axes which are slightly skewed generally in the manner of a die rolling machine, one of the dies being termed a female die and comprising a helical operative surface; and the other die, the male die, comprising a rotary member having a series of circumferentially spaced inserts or cutters thereon which cooperate with the helical surface as the dies are rotated to slit (or form only) the strip and provide the effect that is described above, the male die inserts being curvilinear (circular) and forming the material between alternate operations on a radius to provide the curved straps or dimples referred to.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which:

FIG. 1 is a view in front elevation illustrating the dies and the relation thereof with respect to the product for the slitting operation;

FIG. 2 is a top view looking in the direction of arrow 2 in FIG. 1;

FIG. 3 is a plan view of the product;

FIG. 4 is a detail view on a larger scale showing the female tooth form for slitting;

FIG. 5 is a similar view showing the corresponding male tooth form;

FIG. 6 is a section on line 6—6 of FIG. 2;

FIG. 7 is a diagram illustrating the coaction of the male and female dies and the skew arrangement thereof, and

FIG. 8 is a detail on a larger scale showing the operative parts for forming without slitting.

In the drawings, the reference numeral 10 indicates the drive shaft for a rotary die 12 which is referred to hereinafter as the "female" die. This die essentially comprises a threadlike generally square-faced cutter which is continuous and helical, this helix being generally indi-

cated by the reference numeral 14 which refers to the "starts" or lands for the helix.

There is a shaft 16 for the male insert die 18. In the case illustrated, the die 18 is provided with a series of generally radial peripherally opening slots or recesses 20, each of which is provided with side walls 22 which are generally parallel and arranged at a slight angle with respect to the axis of the die on the shaft 16 to match the helix angle of the female die. Intersecting each slot there is a bore at 24 for the reception of a pin to hold an insert here illustrated as generally round, e.g. in the form of a wheel 26, in the respective recess. These wheels are provided with relatively small circular dies 28 which cooperate with the female die as is shown in FIGS. 1, 2 and 7, intersecting the space between starts or lands.

Referring now to FIGS. 4 and 5, it is here shown that for slitting, the helix cutter or thread 14 for instance is generally square-faced and narrower at its face or cutting edge portion 30 than inwardly thereof toward its root and the opposite is true of the peripheral cutting edge of the male insert die as shown at 32. The cutting or working edges at 30 and 32 correspond with each other so that a workpiece therebetween will be slit thereby, there being of course a slit formed at each edge of the thread, or at each edge of the male insert die 28.

The flat strip of stock at 40 is entered between the dies as shown in FIG. 2 and positioned so that it is intersected by a male insert 28 as it enters between two starts of the thread 14. This slits the stock transversely thereof and at the same time the insert 28 forms the material outwardly on an arc concentric to the die 18 as is indicated at 42 in FIG. 1.

At the same time, the face of the helix 14 in the female die may form or help to form the next slit strip or rib oppositely as at 44, see FIG. 1, and the threads act as supports for the male inserts forming the product as shown. The skew arrangement of the dies advances the product in the direction of the arrow 46 in FIG. 2.

Shown in FIG. 1 but omitted from FIG. 2 for clarity of illustration are a pair of supports and guides 48 engaging the edges of the stock at selected points or areas such as between the dies or in front or in back, or in any combination, to provide an effective top and bottom constraint.

Also a set of preforming rolls 50 can be used at the feeding-in side of the dies to form the strip to the radius of the female die. These forming rolls enhance the operation of the apparatus but are not always essential.

A set of flattening rolls 52 help to pull the completed work out of the dies and flatten or partially flatten it for some purposes e.g. vertabrae for weatherstripping. These rolls 52 are not essential but are optional.

Referring to FIG. 8 there is here shown female die 12' and corresponding male insert 28' which are blunt and do not cooperate to cut or slit but only to deform the strip 40; in this case making a series of dimples 54. By adjusting the distance between the dies 12 and 18, the degree of penetration is varied.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. A slitting and forming apparatus comprising a pair of cooperating male and female rotary dies and means to support and rotate the same with the axes thereof in skewed relation, a generally continuous helical operative surface on the female die, and intermittent cooperating mutually circumferentially spaced operative surfaces on the male die, the intermittent surfaces being arranged to intersect seriatim the space between adjacent starts of the helical surface to operate on a strip-type workpiece pass-

3

ing between the dies in a direction generally parallel to the skewed axes of the dies, thereby providing a series of spaced operations in the workpiece longitudinally of the latter.

2. The apparatus of claim 1 including inserts for the male die, each insert bearing one of the intermittent surfaces. 5

3. The apparatus of claim 1 including freely rotatable inserts for the male die, each insert bearing one of the intermittent surfaces. 10

4. The apparatus of claim 1 including guiding means for the workpiece at a side edge thereof. 10

5. The apparatus of claim 1 including forming rolls at the in-feed side of the die rolls, said forming rolls being constructed and arranged to impart a transverse curve in the workpiece generally conforming to the surface of the female die. 15

6. The apparatus of claim 1 including means at the out-feed side of the dies to pull the workpiece therethrough.

4

7. The apparatus of claim 1 including means at the out-feed side of the dies to pull the workpiece therethrough to flatten the same.

8. The apparatus of claim 1 wherein the operative surfaces are relatively sharp and slit the material.

9. The apparatus of claim 1 wherein the operative surfaces are relatively blunt and dimple the materials.

#### References Cited

##### UNITED STATES PATENTS

3,172,320 3/1965 Talbot ----- 72—186

CHARLES W. LANHAM, *Primary Examiner*.

LOWELL A. LARSON, *Assistant Examiner*.

U.S. CI. X.R.

72—191; 83—330, 345